PATENT SPECIFICATION 722,734

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COMPLETE SPECIFICATION

Improvements relating to resilient torque transmitting couplings

We, THE ENGLISH ELECTRIC COMPANY LIMITED, of Queens House, 28, Kingsway, London, W.C.2, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to resilient torque transmitting couplings of the kind in which torque is transmitted from one coupling member to the other coupling member through a plurality of circumferentially spaced, tangentially disposed, tie-bars, the tie-bars being connected to the respective coupling members through separate resilient units arranged to provide resilience between the tie-bars and the coupling members in the circumferential direction of motion of the coupling and to allow tilting of the tie-bars relative to their tangential dispositions.

According to the invention, in a coupling of this kind each resilient unit includes rubber arranged to be stressed primarily in shear with relative movement of the tie-bars and the coupling members in the circumferential direction of motion of the coupling.

According to a further feature of the invention, the rubber of the resilient units is in the form of a sleeve, the bore of which is located axially on the tie-bar and the outer circumferential surface of which is located axially in a housing on the corresponding coupling member concentric with the tie-bar.

Other features of the invention will appear from the following description with reference to the drawings accompanying the Provisional Specification where there is shown a torque transmitting coupling embodying the invention as applied to a quill drive for an axle hung electric traction motor. Fig. 1 is a front elevation of the coupling partly in section, whilst Fig. 2 is a sectional side elevation taken on the line A-A of Fig. 1.

Referring now to the drawings, the reference 10 indicates a hollow quill which is rigidly secured to the axle hung traction motor (not shown) and which surrounds the vehicle axle 11. Journalled on the quill by means of roller bearings 12 is a gear wheel 13 which meshes with the driving pinion of the traction motor. The gear wheel is enclosed in a gear case 14 attached to the motor, oil throwers 15 and 16 being formed on the gear wheel to retain the oil within the case. The bearings themselves are sealed by means of sealing members 17 and 18 attached to the quill and to the gear wheel respectively.

Keyed to the vehicle axle 11 by means of a key 19 is a six-armed spider 20. The outer ends of the arms 21 of the spider have formed integral therewith bosses 22 in each of which there is fitted a resilient unit comprising inner and outer metal sleeves 23, 24 respectively and an intermediate rubber sleeve 25. The inner sleeve tapers to a smaller diameter at each end, whilst the bore of the outer sleeve is tapered in a similar way towards each end so that the rubber sleeve 25 assumes approximately a barrel shape. The outer sleeve 24 is retained in position in the boss by means of a screwed bush 26.

Secured to the gear wheel 13 by means of bolts 27 is a ring 28 provided with six axially projecting arms 29. Each arm is formed with a boss 30 at its outer end which lies normally in axial alignment with the boss on the adjacent arm of the spider and in which there is fitted a resilient unit identical with the resilient units carried by the spider arms. The inner sleeves of each

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pair of axially aligned units are coupled together by means of a floating tie-bar 31 which tapers towards each end to fit the tapered bore of the sleeves which are clamped to the tie-bar by means of nuts 31a.

Each tie-bar has a shoulder 32 against which a rigid disc 33 is clamped by means of a nut 34. Metal faced rubber washers 35 are bonded to each face of the discs. The ring 28 is keyed to the gear wheel 13 by means of a radially disposed key 36.

From the foregoing it will be apparent that torque will be transmitted from the gear wheel to the vehicle axle through the six pairs of resilient units, the tangential force being transmitted from one of each pair of units to the other of the pair through the floating tie-bars. It will also be apparent that when torque is transmitted, the rubber of the units will be subject to shear stress in the axial direction, the deflection being approximately equal in each unit. In other words, the resilient units of each pair operate in series so far as relative rotational deflection of the gear wheel and vehicle axle is concerned, so that a relatively large degree of resilience is obtained.

The discs carried by the tie-bars serve to limit the relative movement between the inner and outer sleeves of the resilient units so that the rubber of the units is not stressed beyond the safe limit. The discs, of course, act in one direction for motoring forces and in the other direction for braking forces.

Relative eccentric deflection of the vehicle axle and the gear wheel is also readily allowed without excessive restraining force, due to the barrel form of the rubber in the resilient units allowing a limited freedom of angular movement of the floating tie-bar without appreciable deformation of the rubber. The rubber in the units may, if desired, be bonded to the inner and outer sleeves.

The invention is not limited to quill drives for electric traction motors, but may be applied to any other form of torque transmitting device. In the case of the example described above the spider 20 could, if desired, be replaced by the track wheel of the vehicle, in which case one set of resilient units would be carried on the track wheel itself.

Where, however, rubber is mentioned in this Specification, it will be understood to include both pure and synthetic rubber.

What we claim is:—

1. A resilient torque transmitting coupling of the kind in which torque is transmitted from one coupling member to the other coupling member through a plurality of circumferentially spaced, tangentially disposed, tie-bars, the tie-bars being connected to the respective coupling members through separate resilient units arranged to provide resilience between the tie-bars and the coupling members in the circumferential direction of motion of the coupling, and to allow tilting of the tie-bars relative to their tangential dispositions, wherein each of said resilient units includes rubber arranged to be stressed primarily in shear with relative movement of the tie-bars and the coupling members in the circumferential direction of motion of the coupling.

2. A resilient torque transmitting coupling according to Claim 1 wherein the rubber of said resilient units is in the form of a sleeve, the bore of which is located axially on the tie-bar and the outer circumferential surface of which is located axially in a housing on the corresponding coupling member concentric with the tie-bar.

3. A resilient torque transmitting coupling according to Claim 2 wherein said rubber sleeve is located between inner and outer concentrically spaced rigid sleeves adapted for attachment to the tie-bar and to the housing respectively, the circumferential surfaces of the rigid sleeves which engage the rubber sleeve being tapered to a smaller diameter at the ends than at the middle thereof.

4. A resilient torque transmitting coupling according to any preceding Claim including abutment means for limiting relative movement of the tie-bars and the coupling members in the circumferential direction of motion of the coupling.

5. A resilient torque transmitting coupling according to Claim 4 wherein said abutment means comprise rubber faced discs secured to the tie-bars between the resilient units and arranged to engage abutments on the resilient units mountings with a predetermined relative movement of the tie-bars and the coupling members.

6. A resilient torque transmitting coupling according to any preceding Claim wherein one coupling member comprises a gear wheel journalled on a quill surrounding an axle, whilst the other coupling member comprises a spider mounted on the axle, the resilient units on the gear wheel being arranged to project between the spokes of the spider.

7. A resilient torque transmitting coupling substantially as described with reference to the drawings accompanying the Provisional Specification.

F. A. WEBSTER,
Agent for the Applicants.

PROVISIONAL SPECIFICATION

Improvements relating to resilient torque transmitting couplings

We, THE ENGLISH ELECTRIC COMPANY, LIMITED, of Queens House, 28, Kingsway, London, W.C.2, a British Company, do hereby declare this invention to be described in the following statement:—

This invention relates to resilient torque transmitting devices of the kind comprising driving and driven members coupled together through the medium of a resilient material such as rubber.

According to one feature of the invention, in such a device a plurality of angularly spaced resilient units are provided on each member and are coupled one with the other through a floating tie rod or bar.

According to a further feature of the invention the resilient units are of the kind relying on a resilient material such as rubber for their resilience.

According to a still further feature of the invention, the tie rods or bars are disposed approximately tangential to the direction of rotation and the resilient units are arranged so that rotational deflection of one member relative to the other stresses the rubber of the units in shear.

Other features of the invention will appear from the following description with reference to the accompanying drawing where there is shown a quill drive for an axle hung electric traction motor embodying the invention. Fig. 1 is a front elevation partly in section, whilst Fig. 2 is a sectional side elevation taken on the line A–A of Fig. 1.

Referring now to the drawing, the reference 10 indicates a hollow quill which is rigidly secured to the axle hung traction motor (not shown) and which surrounds the vehicle axle 11. Journalled on the quill by means of roller bearings 12 is a gear wheel 13 which meshes with the driving pinion of the traction motor. The gear wheel is enclosed in a gear case 14 attached to the motor, oil throwers 15 and 16 being formed on the gear wheel to retain the oil within the case. The bearings themselves are sealed by means of sealing members 17 and 18 attached to the quill and to the gear wheel respectively.

Keyed to the vehicle axle 11 by means of a key 19 is a six-armed spider 20. The outer ends of the arms 21 of the spider have formed integral therewith bosses 22 in each of which there is fitted a resilient unit comprising inner and outer sleeves 23, 24 respectively and an intermediate rubber sleeve 25. The inner sleeve tapers to a smaller diameter at each end, whilst the bore of the outer sleeve is tapered in a similar way towards each end so that the rubber sleeve 25 assumes approximately a barrel shape. The outer sleeve 24 is retained in position in the boss by means of a screwed bush 26.

Secured to the gear wheel 13 by means of bolts 27 is a ring 28 provided with six axially projecting arms 29. Each arm is formed with a boss 30 at its outer end which lies normally in axial alignment with the boss on the adjacent arm of the spider and in which there is fitted a resilient unit identical with the resilient units carried by the spider arms. The inner sleeves of each pair of axially aligned units are coupled together by means of a floating tie-bar 31 which tapers towards each end to fit the tapered bore of the sleeves which are clamped to the tie-bar by means of nuts 32.

Each tie-bar has a shoulder 32 against which a rigid disc 33 is clamped by means of a nut 34. Metal faced rubber washers 35 are bonded to each face of the discs. The ring 28 is keyed to the gear wheel 13 by means of a radially disposed key 36.

From the foregoing it will be apparent that torque will be transmitted from the gear wheel to the vehicle axle through the six pairs of resilient units, the tangential force being transmitted from one of each pair of units to the other of the pair through the floating tie-bars. It will also be apparent that when torque is transmitted, the rubber of the units will be subject to shear stress in the axial direction, the deflection being approximately equal in each unit. In other words, the resilient units of each pair operate in series so far as relative rotational deflection of the gear wheel and vehicle axle is concerned, so that a relatively large degree of resilience is obtained.

The discs carried by the tie-bars serve to limit the relative movement between the inner and outer sleeves of the resilient units so that the rubber of the units is not stressed beyond the safe limit. The discs, of course, act in one direction for motoring forces and in the other direction for braking forces.

Relative eccentric deflection of the vehicle axle and the gear wheel is also readily allowed without excessive restraining force, due to the barrel form of the rubber in the resilient units allowing a limited freedom of angular movement of the floating tie-bar without appreciable deformation of the rubber. The rubber in the units may, if desired, be bonded to the inner and outer sleeves. Where a driving pinion and gear wheel is provided at each end of the motor the arrangement just described may be

duplicated. Preferably, in this case, the drive is made right and left handed so that the two devices act in the same direction.

The invention is not, of course, limited to quill drives for electric traction motors, but may be applied to any other form of torque transmitting device, whether the device is arranged for eccentric deflection of the driving and driven members or not. In the case of the example described above the spider 20 could, if desired, be replaced by the track wheel of the vehicle, in which case one set of resilient units would be carried on the track wheel itself.

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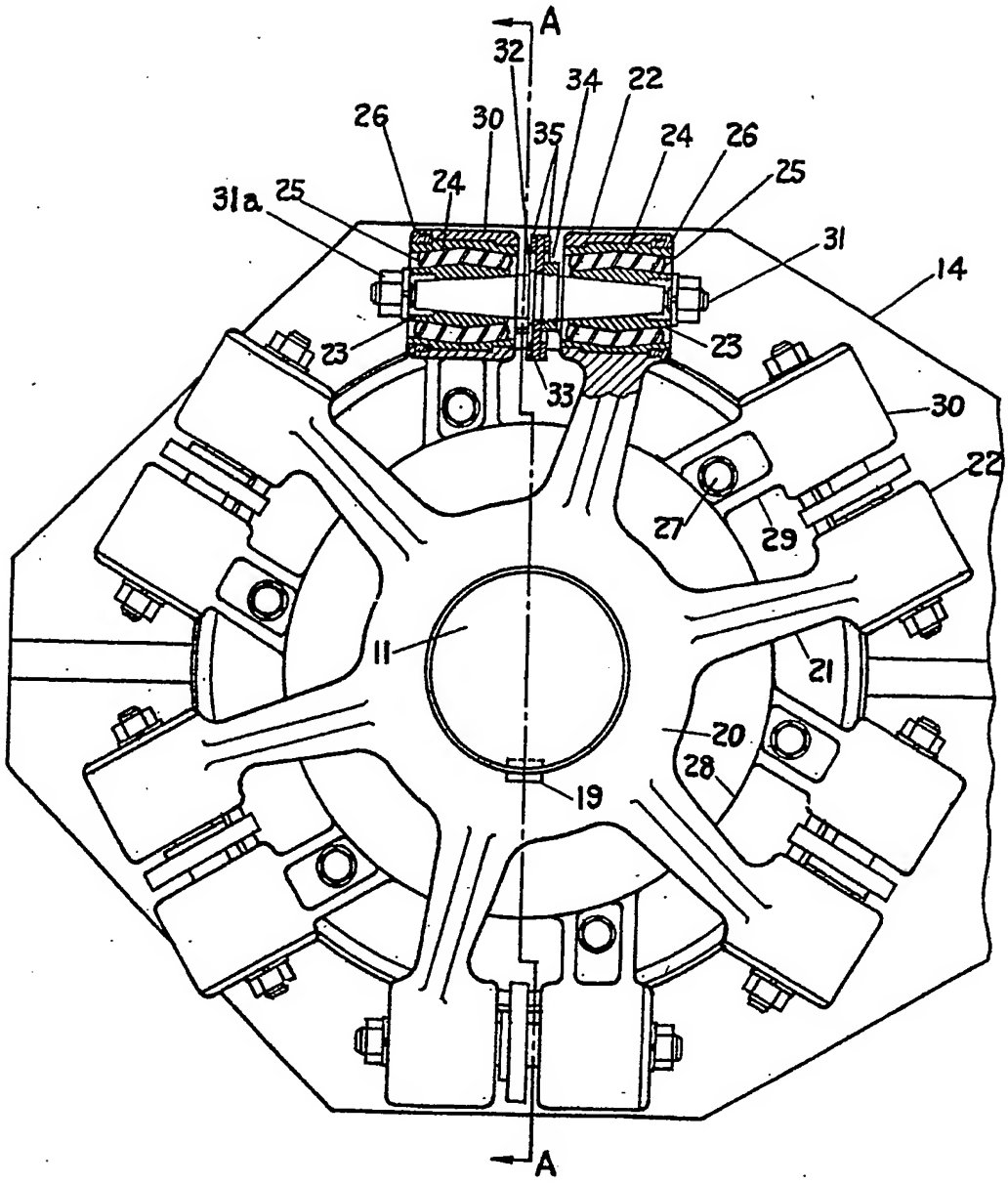
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FIG. 1

722,734 PROVISIONAL SPECIFICATION

2 SHEETS

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SHEETS 1 & 2

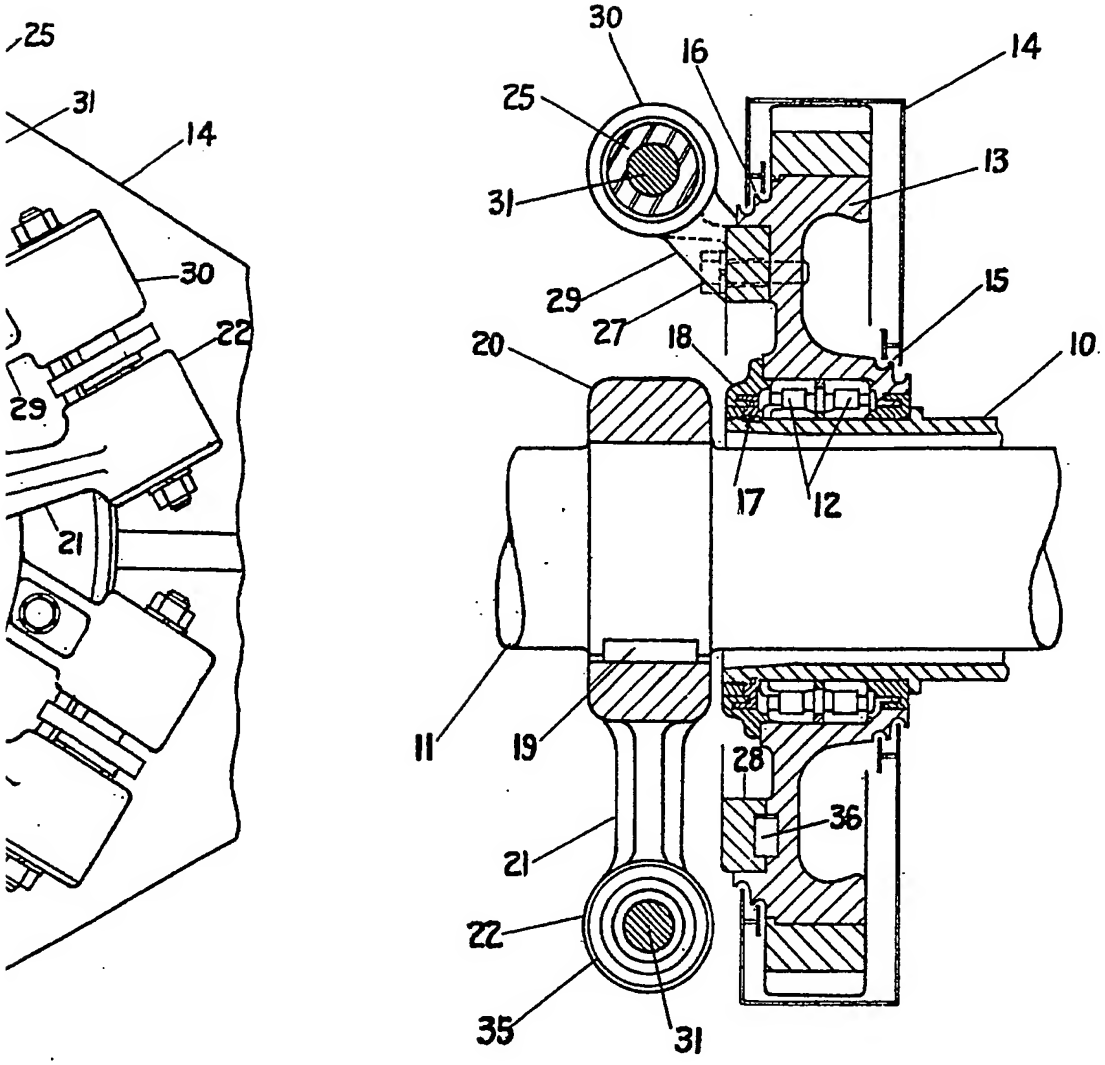

FIG. 2

722,734 PROVISIONAL SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale.*
SHEETS 1 & 2

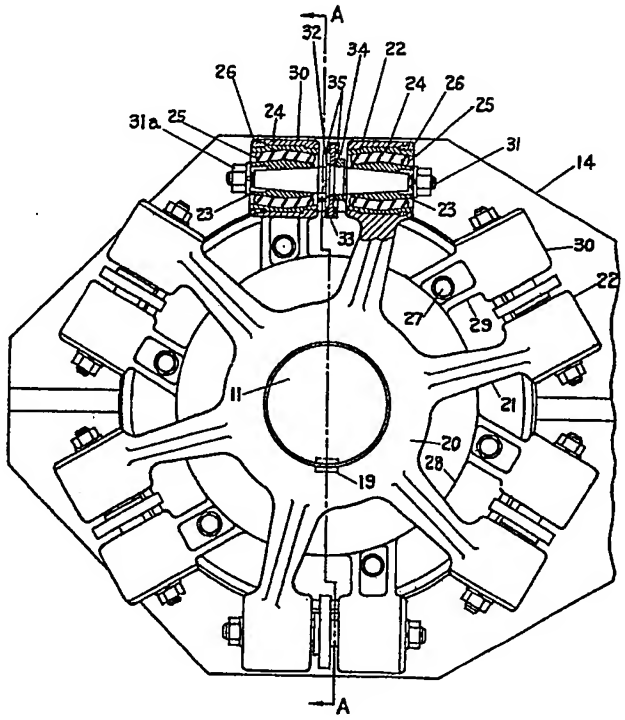

FIG. 1

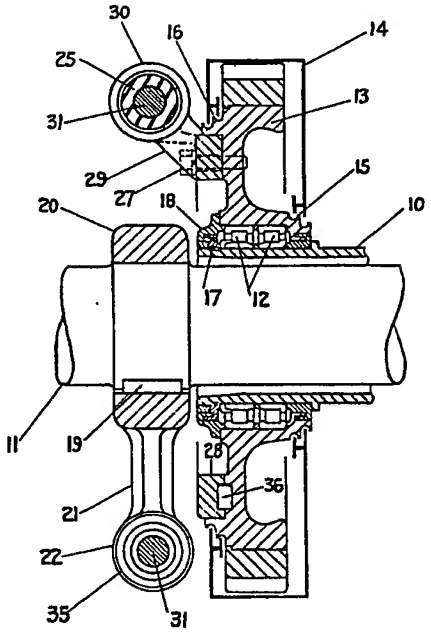

FIG. 2